CLAIMS:

1. A method for controlling the operation of an AC motor, the method comprising controllably varying a frequency f of a driving voltage supplied to the motor, by transforming an input harmonic voltage signal of a certain given frequency f_0 into the driving voltage signal in the form of a periodic function with the period formed by two groups of opposite polarities, each of said groups including a desired number of pulses each shaped as a half-wave of the input voltage signal, and at least one of said groups including the at least two gapless unipolar pulses, said periodic function having the frequency f smaller than the frequency f_0. by a predetermined factor defined by a number N of the pulses in the period of the driving voltage.

2. The method of Claim 1, wherein said transforming comprises applying a first processing to the input voltage to produce a sequence of the unipolar gapless pulses each shaped as the half wave of the input voltage signal; and applying a second processing to said sequence of the unipolar gapless pulses to arrange them in the groups of alternating polarities, the group including the desired number of the unipolar pulses, so as to provide the desired number N of the pulses within the period of the driving signal.

3. The method of Claim 1 or 2, wherein the frequency f of the driving voltage signal is determined as $2f_0/N$.

4. The method of any one of preceding Claims, wherein said transforming comprises applying pulse shaping to each of said pulses so as to divide the pulse into a predetermined number of high frequency spaced-apart sub-pulses.

5. The method of Claim 4, comprising selecting a number of the high frequency sub-pulses inside the half-wave pulse to equalize maximal amplitudes of electric current generated by the half-waves and to keep the amplitudes equal to a predetermined value.

6. The method of Claim 4 or 5, wherein the number of the sub-pulses varies depending on a position of the corresponding half wave inside the group.

7. The method of Claim 6, wherein a width of the sub-pulses in a second half wave is 1.5-2 times narrower than that in the first half wave, and a width of the sub-pulses in a third half wave is 1.5 times narrower than that in the second half wave.

8. The method of Claim 6 or 7, comprising measuring an electric current through the motor during each half wave of the input voltage, and adjusting the width of the sub-pulses inside each of the half waves to provide that maximal values of the electric currents during all the half waves are equalized and kept equal to a preset value.

9. The method of any one of Claims 4 to 8, wherein said dividing comprises defining a time interval, during which the high frequency sub-pulses are formed, limited to a certain zone inside each of the half wave pulse.

10. The method of any one of Claims 4 to 9, wherein said dividing comprises defining a width of the high frequency sub-pulse at the beginning of each of the half wave pulses to be larger than the sub-pulses width at the end of the half wave pulse.

11. The method of Claim 10, comprising measuring an operative parameter of the motor, $\cos\varphi$, and controllably decreasing the width of the sub-pulses in the last half wave of the group, such that when a change of polarity occurs, an electric current in the motor is equal to zero.

12. The method of any one of Claims 4 to 11, comprising, during the operation of the motor, comparing a time profile of the electric current through the motor with a time profile of a standard harmonic wave curve, and controllably adjusting a width of the high frequency sub-pulses to provide best fitting between the profiles of the electric current and the harmonic wave curve.

13. The method of Claim 12, wherein said controllable adjusting comprises, upon detecting that amplitude of the electric current exceeds a predetermined value, decreasing the width of the sub-pulses.

14. The method of Claim 12, wherein said controllable adjusting comprises, upon detecting that amplitude of the electric current is smaller than a predetermined value, increasing the width of the sub-pulses.

15. The method of Claim 13 or 14, wherein said controllable adjusting comprise determining a time delay of control signals in relation to the measured amplitude of the electric current.

16. The method of any one of preceding Claims, wherein said transforming comprises providing different number of the half wave pulses within the groups of opposite polarities.

17. The method of any one of Claims 1 to 11, wherein said transforming comprises providing the same number of the half wave pulses within the groups of opposite polarities.

18. The method of any one of preceding Claims, wherein said transforming comprises providing, for each group of the unipolar half wave pulses that the last half wave pulse of the group is followed by a narrow demagnetizing pulse of the opposite polarity of the successive group.

19. The method of any one of preceding Claims, comprising, during the operation of the motor, measuring a rotational speed of the motor and controllably varying the number of the half wave pulses in the group to maintain a required value of the rotational speed.

20. The method of Claim 19, comprising, upon detecting that the rotational speed exceeds the required value, increasing the number of the half wave pulses in each of the groups.

21. The method of Claim 19, comprising, upon detecting that the rotational speed falls below the required value, decreasing the number of the half wave pulses is decreased in the groups of the same polarity.

22. The method of any one of Claims 4 to 21, comprising, during a start of the motor, dividing each of the half wave pulses into the maximal possible number of the sub-pulses, each of the sub-pulses being of a minimal width, and

gradually decreasing the frequency of the sub-pulses and increasing their width until reaching predetermined values.

23. An electronic device for controlling the operation of an AC motor, the device being configured to be connectable to a voltage supply unit generating an input harmonic voltage signal of a certain frequency f_0 and to be connectable to the AC motor, and being configured and operable to transform the input voltage signal into a periodic function of a driving voltage signal, the period of said function being formed by two alternating groups of opposite polarities, each of said groups including a desired number of pulses each shaped as a half-wave of the input voltage signal, and at least one of said groups including at least two unipolar pulses, said periodic function having a frequency f smaller than the frequency f_0. by a predetermined factor defined by a number N of the pulses within the period of the driving signal.

24. The device of Claim 23, comprising a rectifier utility connectable to the voltage supply unit for receiving the input voltage signal, the rectifier utility being configured and operable for processing the input voltage signal to produce a sequence of the unipolar gapless pulses each shaped as the half wave of the input voltage signal; and a pulse grouping utility configured and operable to receive said sequence of the unipolar gapless pulses and process it to arrange the pulses in the groups of alternating polarities.

25. The device of Claim 24, wherein the rectifier utility comprises a diode bridge assembly.

26. The device of Claim 24 or 25, wherein the pulse grouping utility comprises a transistor bridge to create the groups of the half-wave pulses of one or the other polarity.

27. The device of any one of Claims 24 to 26, wherein said pulse grouping utility is configured and operable to divide each of the half-wave pulses into a predetermined number of high frequency sub-pulses.

28. The device of Claim 27, wherein said pulse grouping utility is configured and operable to vary a number of the high frequency sub-pulses inside the half-

wave pulse to equalize maximal amplitudes of electric current generated by the half-waves and to keep the amplitudes equal to a predetermined value.

29. The device of Claim 27, wherein said pulse grouping utility is configured and operable to set the number of the sub-pulses depending on a position of the corresponding half wave pulse inside the group.

30. The device of any one of Claims 27 to 29, comprising a controller utility configured and operable to measure an electric current through the motor during each half wave of the input voltage, and adjusting the width of the sub-pulses inside each of the half waves to provide that maximal values of the electric currents during all the half waves are equalized and kept equal to a preset value.

31. The device of any one of Claims 27 to 30, wherein said pulse grouping utility is configured and operable to define a width of the high frequency sub-pulse at the beginning of each of the half wave pulses to be larger than the sub-pulses width at the end of the half wave pulse.

32. The device of Claim 31, comprising a controller utility configured and operable for measuring $cos\varphi$ of the motor during operation and controllably decreasing the width of the sub-pulses in the last half wave of the group, so as to provide that the electric current through the motor is equal to zero when the group changes its polarity.

33. The device of any one of Claims 23 to 32, comprising a controller utility configured and operable to compare a time profile of the electric current function during the operation of the motor with a standard sinusoidal curve, and controllably adjusting a width of the high frequency sub-pulses to provide optimized fitting between the electric current profile and the sinusoidal curve.

34. The device of any one of Claims 23 to 33, wherein the driving voltage function is asymmetric, the two groups of opposite polarities having different number of the half wave pulses.

35. The device of any one of Claims 23 to 33, wherein the driving voltage function is symmetric, the two groups of opposite polarities having the same number of the half wave pulses.

36. The device of any one of Claims 27 to 35, wherein the last half wave pulse of the first group is followed by a narrow demagnetizing sub-pulse of the opposite polarity of the second group.

37. The device of any one of Claims 23 to 36, comprising a controller utility configured and operable for measuring a rotational speed of the motor and controllably varying the number of the half wave pulses in the group to maintain a required value of the rotational speed.

38. The device of any one of Claims 23 to 37, comprising a comparator utility configured and operable for signaling beginning and end of a positive half-wave period of the input voltage signal and for signaling beginning and end of a negative half-wave period of the input voltage signal.